PRINCE GEORGE'S COUNTY GREEN SUMMIT 2016

Climate Change : From Theory to Practice

Adaptation Response to Health Impacts Under the Maryland Climate Action Plan

Clifford S. Mitchell, MS, MD, MPH

Director, Environmental Health Bureau

Maryland Department of Health and Mental Hygiene

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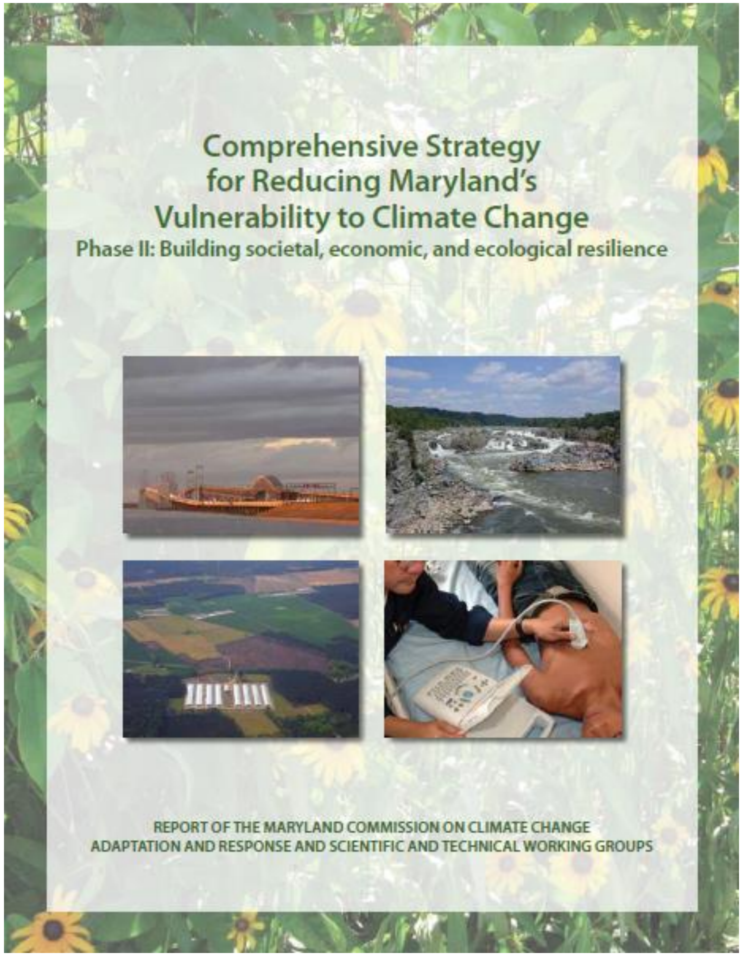
Outline

- Describe public health strategy in context of Maryland State Climate Action Plan
- Describe the Maryland Climate and Health Profile Report and its findings
- Discuss next steps for Maryland Public Health Strategy for Climate Change

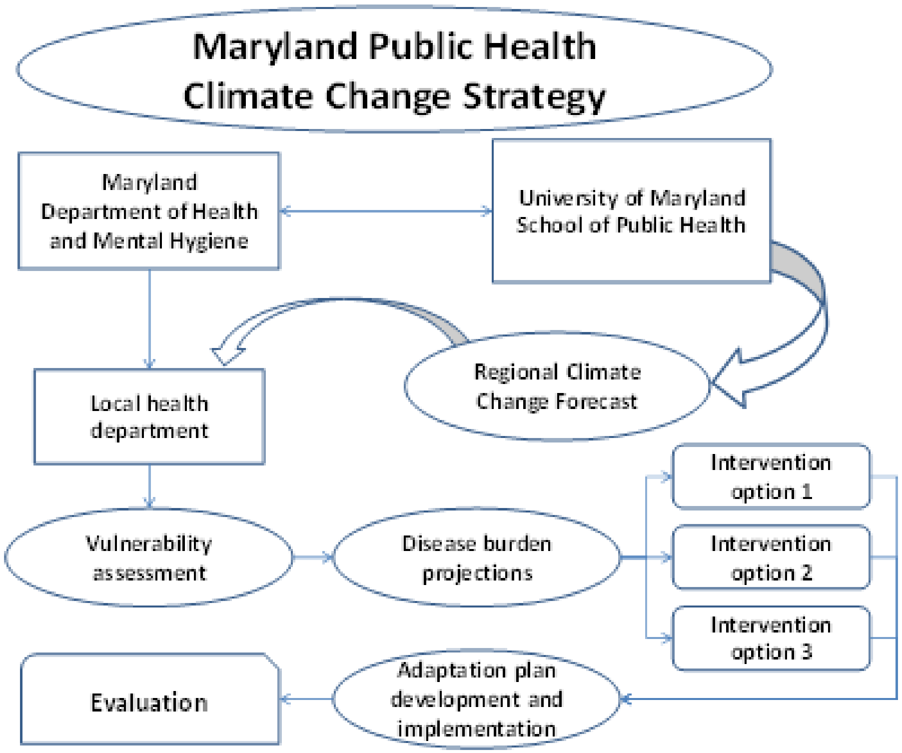
Key Recommendations for Adaptation



- Health
  - Conduct vulnerability assessments to gain a better understanding of risks and inform preventative responses
  - Integrate impact reduction strategies into State and local planning practices
  - Streamline and revise data collection and information dissemination channels

Public Health Strategy for Climate Change

- 2012 – CDC funds Maryland Public Health Strategy for Climate Change, using CDC BRACE framework (Building Resilience Against Climate Effects)
- Collaboration with UMCP, Wicomico, Prince George's, Washington Counties, Baltimore City



Climate and Health Profile Report

- Focuses on using historical health data, climate projections to anticipate likely impacts across the State
- Outcomes:
  - Injuries and temperature-related events
  - Respiratory diseases
  - Waterborne illness and injuries
  - Foodborne illness
  - Vector borne disease

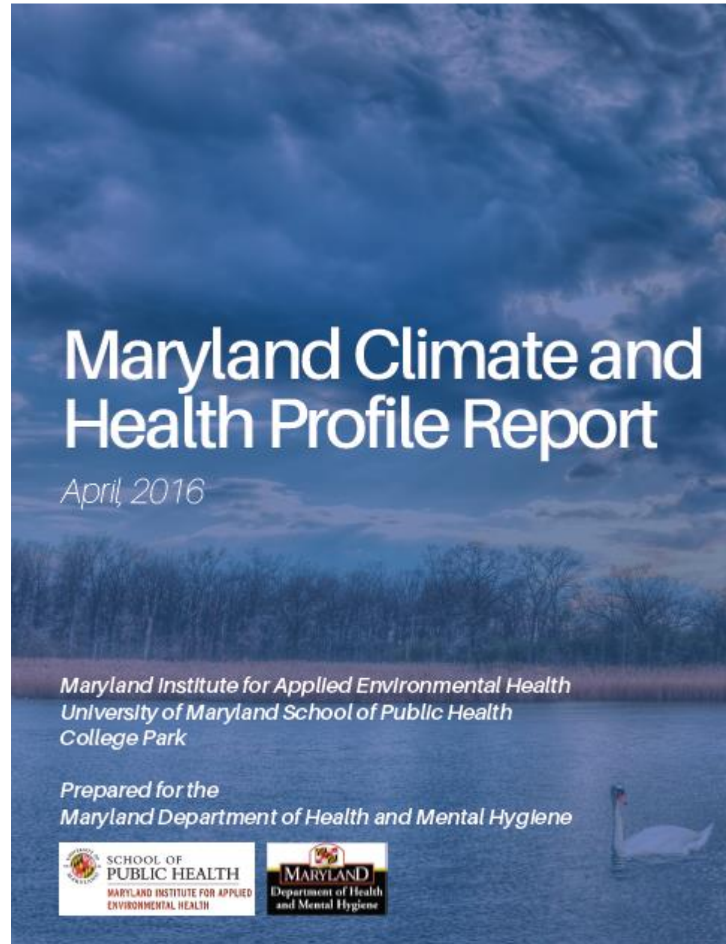
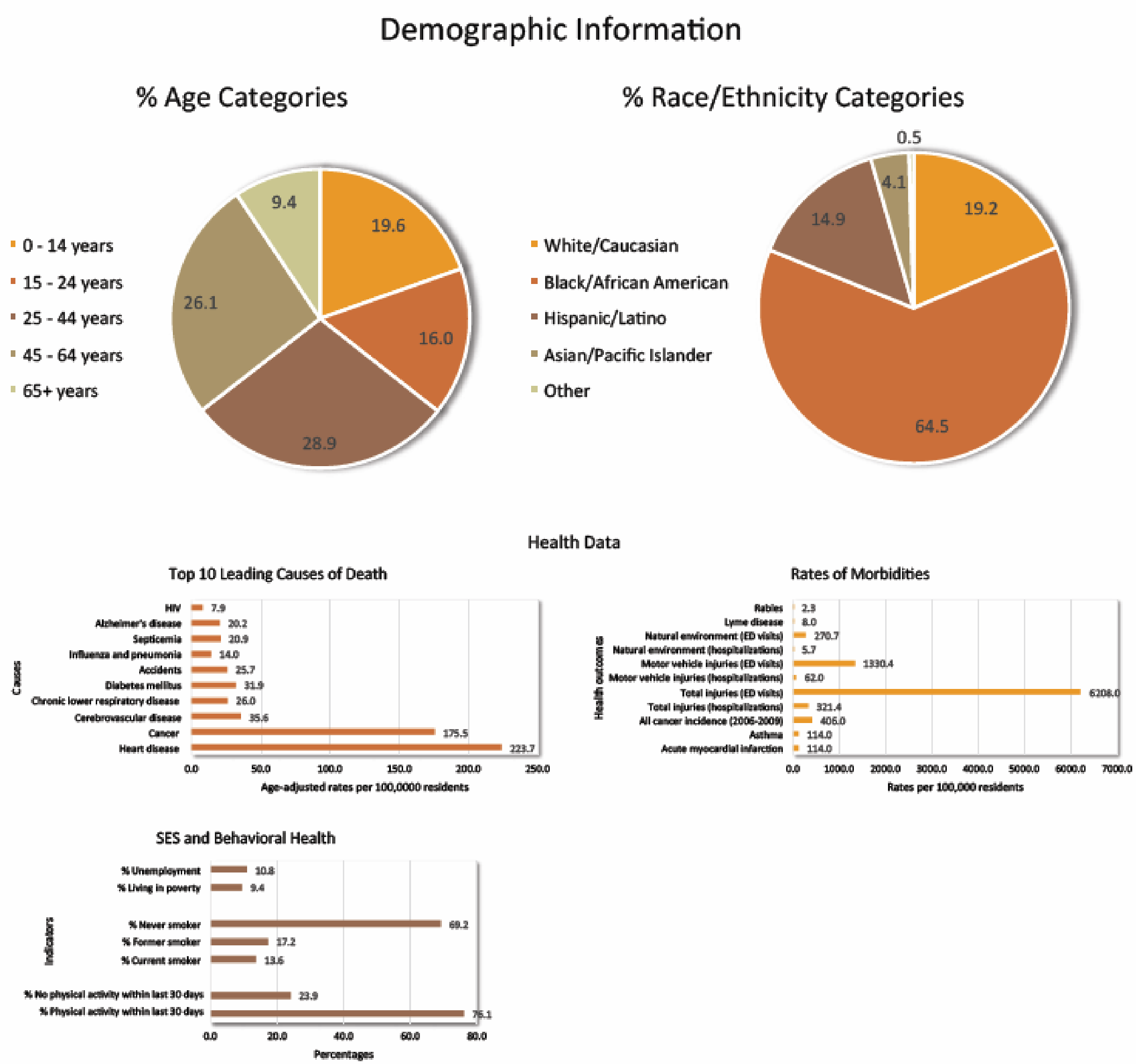


Figure 9. Demographic information for Prince George's County population, in 2010.



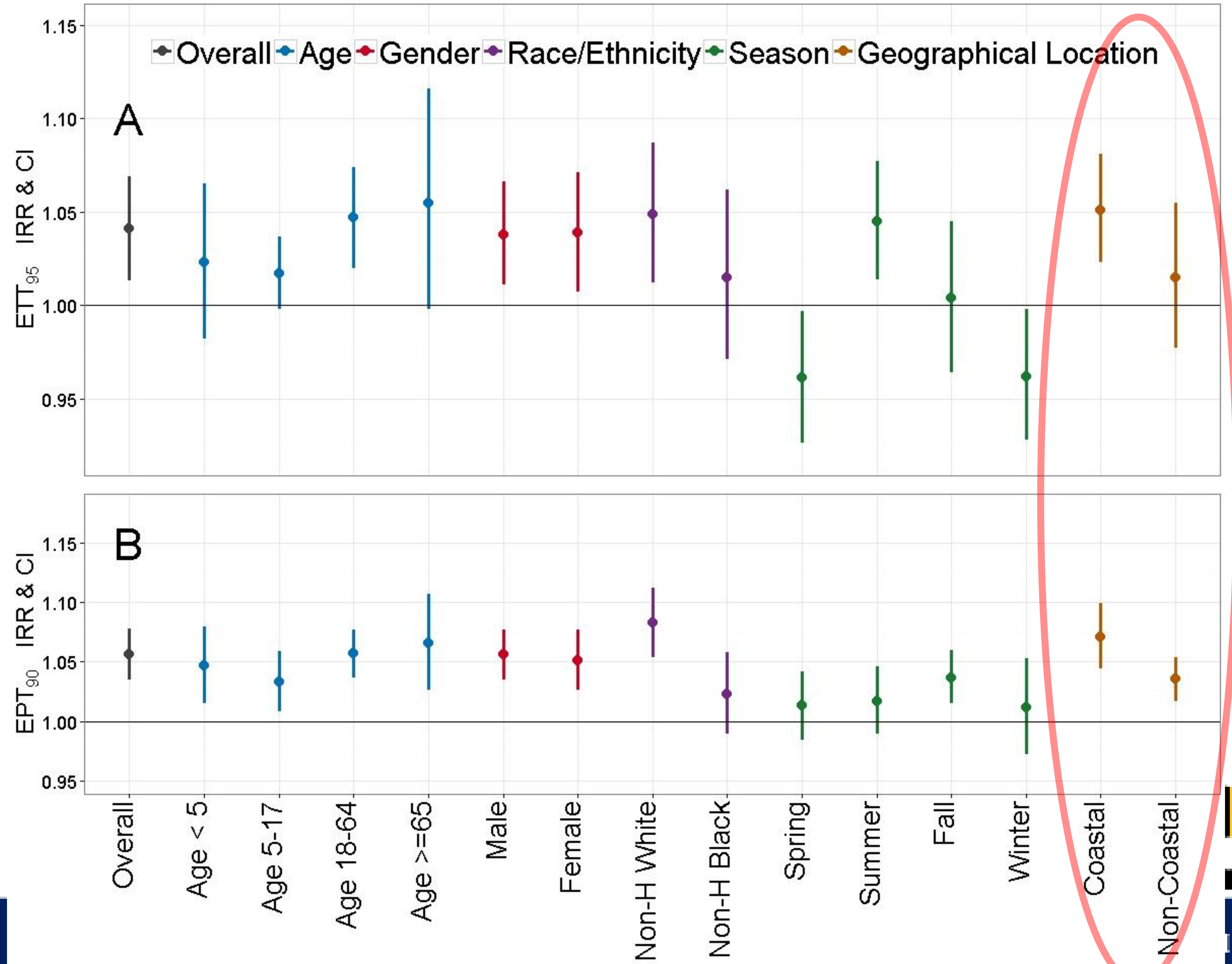
- Demographic data on local jurisdictions, including indicators of morbidity, mortality, socio-economic status

Historical Trends of Health Outcomes with Extreme Temperature and Precipitation

Salmonellosis: Incidence Rate Ratios and 95 % Confidence Intervals for Exposure to Extreme Events

IRR (95%CI) for Temperature

IRR (95%CI) for Precipitation



Vehicle Injury: Incidence Rate Ratios w/ 95% CI for Exposure to Extreme Events

Characteristics		Extreme Temp. (ETT_{95})	Extreme Precip. (EPT_{90})
Overall Model		1.01 [1.00-1.02]	1.23 [1.22-1.24]
Season			
	Spring	1.05 [1.03, 1.07]	1.20 [1.18, 1.21]
	Summer	1.09 [1.07, 1.10]	1.24 [1.22, 1.25]
	Fall	0.88 [0.86, 0.90]	1.32 [1.31, 1.34]
	Winter	0.97 [0.96, 0.99]	1.13 [1.12, 1.15]

Projections of Health Outcomes with Extreme Temperature and Precipitation Based on Climate Forecasts

Findings – Statewide and Regional

- Across the range of likely outcomes, estimated magnitude of impacts for the State as a whole:

Table 1. Projected change in disease rates associated with extreme heat events in Maryland during summer months.

HEALTH OUTCOME	RATES IN SUMMER*			PROJECTION RANKING
	2010	2040	% Change	
SALMONELLA INFECTION	6.1	7.8	28.0	SMALL
HOSPITALIZATION FOR HEART ATTACK	38.2	64.3	68.4	MODERATE
HOSPITALIZATION FOR ASTHMA	29.4	69.6	136.8	LARGE

*Rate per 100,000 residents, calculated as a seasonal average.

- And for each pilot jurisdiction in different regions of the State:

Table 9. Projected change in disease rate in Prince George's County during summer months.

HEALTH OUTCOME	RATES IN SUMMER *			PROJECTION RANKING
	2010	2040	% Change	
SALMONELLA INFECTION	4.1	4.8	16.9	SMALL
HOSPITALIZATION FOR HEART ATTACK	24.2	29.7	22.5	SMALL
HOSPITALIZATION FOR ASTHMA	22.2	38.9	75.0	MODERATE

*=Rate per 100,000 residents, calculated as a seasonal average.

Next Steps

- Maryland Climate Commission Adaptation and Response Working Group
- Continuing work on climate-health projections for State, and for local jurisdictions and planners
- Public engagement around adaptation planning
- Use of Environmental Public Health Tracking, other data display tools to help make data and projections available to individuals and groups

Outreach

International Journal of *Environmental Research and Public Health*

MDPI

Article

Vulnerable Populations Perceive Their Health as at Risk from Climate Change

Karen L. Akerlof [1,*], Paul L. Delamater [2], Caroline R. Boules [1], Crystal R. Upperman [3] and Clifford S. Mitchell [4]

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1 Center for Climate Change Communication, George Mason University, Fairfax, VA 22030, USA; cboules@masonlive.gmu.edu
2 Department of Geography and GeoInformation Science, George Mason University, Fairfax, VA 22030, USA; pdelamat@gmu.edu
3 University of Maryland School of Public Health, College Park, MD 20742, USA; cromeo@umd.edu

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Full length article

Climate change, extreme events and increased risk of salmonellosis in Maryland, USA: Evidence for coastal vulnerability

Chengsheng Jiang [a,1], Kristi S. Shaw [a,1], Crystal R. Upperman [a], David Blythe [b], Clifford Mitchell [b], Raghu Murtugudde [c], Amy R. Sapkota [a,2], Amir Sapkota [a,*,2]

[a] *Maryland Institute for Applied Environmental Health, University of Maryland School of Public Health, College Park, MD, United States*
[b] *Prevention and Health Promotion Administration, Maryland Department of Health and Mental Hygiene, Baltimore, MD, United States*
[c] *Earth System Science Interdisciplinary Center, College of Computer, Mathematical and Natural Sciences, University of Maryland, College Park, MD, United States*

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ABSTRACT

Background: *Salmonella* is a leading cause of acute gastroenteritis worldwide. Patterns of salmonellosis have been linked to weather events. However, there is a dearth of data regarding the association between extreme events and risk of salmonellosis, and how this risk may disproportionately impact coastal communities.
Methods: We obtained *Salmonella* case data from the Maryland Foodborne Diseases Active Surveillance Network (2002–2012), and weather data from the National Climatic Data Center (1960–2012). We developed exposure metrics related to extreme temperature and precipitation events using a 30 year baseline (1960–1989) and linked them with county-level salmonellosis data. Data were analyzed using negative binomial Generalized Estimating Equations.
Results: We observed a 4.1% increase in salmonellosis risk associated with a 1 unit increase in extreme temperature events (incidence rate ratio (IRR):1.041; 95% confidence interval (CI):1.013–1.069). This increase in risk was more pronounced in coastal versus non-coastal areas (5.1% vs 1.5%). Likewise, we observed a 5.6% increase in salmonellosis risk (IRR:1.056; CI:1.035–1.078) associated with a 1 unit increase in extreme precipitation events, with the impact disproportionately felt in coastal areas (7.1% vs 3.6%).
Conclusions: To our knowledge, this is the first empirical evidence showing that extreme temperature/precipitation events—that are expected to be more frequent and intense in coming decades—are disproportionately impacting coastal communities with regard to salmonellosis. Adaptation strategies need to account for this differential burden, particularly in light of ever increasing coastal populations.

1. Introduction

Salmonella causes an estimated 1.2 million cases of acute gastroenteritis, including 23,000 hospitalizations and 450 deaths, in the United States each year (Scallan et al., 2011). In Maryland, 9529 cases of culture-confirmed cases of *Salmonella* infections were reported to the FoodNet program between 2002 and 2012. *Salmonella* infections have been attributed to a number of diverse sources, including produce, meats and eggs (Pires et al., 2014). Salmonellosis typically self-resolves in 5–7 days, although more serious sequelae, including septicemias and infections in immunocompromised individuals, require medical treatment (Hohmann, 2001). *Salmonella* infections proliferate during seasons characterized by elevated temperatures and precipitation, which can amplify bacterial replication and transmission to surface water and food crops, potential sources of infection (Grjibovski et al., 2014; Haley et al., 2009; Kovats et al., 2004; Lal et al., 2013; Micallef et al., 2012; Zhang et al., 2010).

Global climate change is expected to increase the frequency and intensity of extreme temperature and precipitation events (IPCC, 2013). A recent report by the Intergovernmental Panel for Climate Change (IPCC) suggests that recent trends in extreme temperature and precipitation events will continue to increase in future decades with more frequent and longer lasting heat waves (IPCC, 2013). A recent time series analysis also demonstrated a continued global increase in the frequency of the most extreme hot days over land, even during the hypothesized "global warming hiatus" (Seneviratne et al., 2014). Likewise, it is estimated that the frequency of extreme El Niño events—characterized by increased extreme heat days and heavy precipitation—will continue to rise in response to continued greenhouse warming (Cai et al., 2014).

Recent studies have provided evidence of an association between weather events and the incidence of *Salmonella* infections (Kovats

* Corresponding author at: Maryland Institute for Applied Environmental Health, University of Maryland School of Public Health, 2234F SPH Building #255, College Park, MD 20742, United States.
E-mail address: amirsap@umd.edu (A. Sapkota).
1 These authors contributed equally.
2 These senior authors contributed equally.

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Climate Change & Energy

Public Attitudes, Behaviors & Policy Support

A Survey of Maryland Residents | Summer 2013

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MARYLAND DEPARTMENT OF HEALTH & MENTAL HYGIENE

Acknowledgements

RESEARCH TEAM

Maryland Institute of Applied Environmental Health University of Maryland, College Park

Amir Sapkota, PhD
Associate Professor

Chengsheng Jiang, PhD
Research Assistant Professor

Sutyajeet Soneja, PhD
Postdoctoral Fellow

Crystal Romeo Upperman, MPA
Program Manager

Jared Fisher, MPH
Graduate Student

Maryland Department of Health and Mental Hygiene

Clifford S. Mitchell, MS, MD, MPH
Director, Environmental Health Bureau

Ann Liu, PhD
Chief Epidemiologist , Environmental Health Bureau

Contributors

Rachel Hess-Mutinda, MSW
Environmental Health Bureau
Maryland Department of Health and Mental Hygiene

Nancy Servatius, PhD
Outreach Coordinator, Environmental Health Bureau Maryland Department of Health and Mental Hygiene

Jed Miller, MD, MPH
Medical Advisor, Science Services Administration Maryland Department of Environment

Steven Davis
Program Officer
Centers for Disease Control and Prevention

Xin-Zhong Liang, PhD
Professor, Department of Atmospheric and Oceanic Sciences
University of Maryland, College Park